Volunteer Firemen

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International

In 17 hours following the London, Texas, school explosion, some 2000 tons of debris were picked up and hauled away. Nowhere but in the oil fields would it have been likely to find the equipment, labor and experience immediately available to make such speed and efficiency possible.

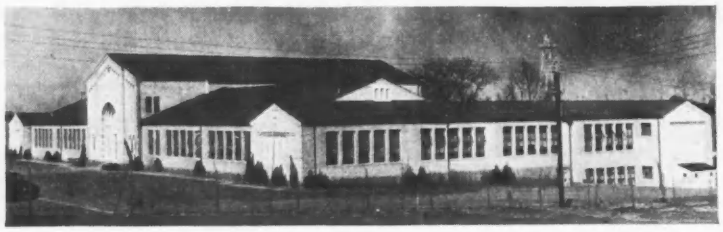
294 Dead in Schoolhouse Explosion

Odorless Gas Gave No Warning—Defectively Installed Gas Heaters Had Been Substituted for Central Heating Plant

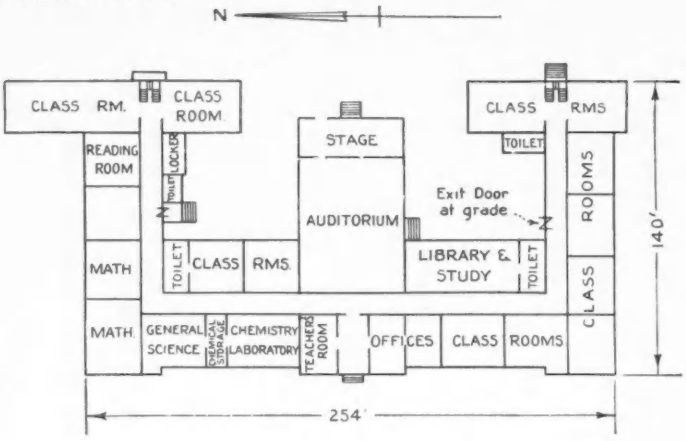
BLOWING up without warning, the huge consolidated school building of the unincorporated communities of London and New London in East Texas contributed the worst disaster of recent years. The explosion occurred on March 18, 1937 at 3:15 o'clock P.M. while the school was in session. There were probably 350 or more persons, pupils and teachers, in the building at the time.

Reports on the disaster reached the nation over the radio or via breakfast table newspapers. The picture unfolded of entire families every child of which was lost, and scarcely a single family which had not lost one or more children. Sympathy was felt and extended from all over the world but the apparent capriciousness with which the blow of this catastrophe fell left observers with a feeling of stunned helplessness. For days afterward, newspaper accounts were confusing and of little help in suggesting how the disaster occurred and what might have been done to prevent it.

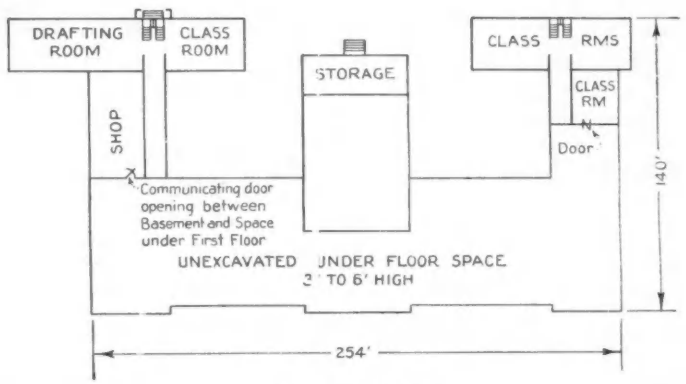
A complete account of the explosion is given in the report by H. Oram Smith, Manager of the Texas Inspection Bureau, and appears in full in the N.F.P.A. QUARTERLY for April which will be received at headquarters of all department members of the Volunteer Firemen's Section. Mr. Smith flew from Dallas to London on receipt of notice of the explosion and assisted the work of a military court of inquiry. Fortunate circumstances enabled Mr. Smith to get to the scene early. We therefore have first-hand the observations of a thoroughly competent and experienced fire protection engineer. His careful and dispassionate account reveals the whole sorry picture of the



Lack of ventilation openings in the unexcavated space beneath the first floor of the London, Texas, school not only allowed natural gas from leaky piping to accumulate there but was responsible for the building being so completely blown to bits.



FIRST FLOOR PLAN



BASEMENT PLAN

sequence of events which resulted in 277 children and 17 adults being blown to kingdom come.

The London Independent School District, Inc., is in the northwest corner of Rusk County. It serves the families of oil field workers over a territory 15 miles or more distant. The school building in which the disaster occurred was a modern structure costing about $300,000. So nearly was it of fire-resistive construction that no fire followed the explosion.

The arrangement of the building shown in the accompanying plan is important to an understanding of what happened. The building was one story high but under most of the first floor there was an unexcavated space very inadequately ventilated. Four openings, each 2 feet wide and 1 foot high, were all the ventilation provided for this space. Natural gas, leaking from piping there, could not have been carried away by the ventilation.

The space also connected by doors with classrooms in the wings. Testimony established with fair certainty that gas accumulated throughout this unventilated space and was set off by a teacher in the act of plugging in a portable electrical connection to one of the machines in the adjoining mechanical training shop the door to which was open.

Every witness agreed that there was but one explosion and that it was a low rumbling noise with none of the blast and roar that might be expected, yet there is evidence of a most terrific force in the extent to which the building was destroyed and the loss of life that came almost instantaneously; testimony of bodies tossed 75 feet into the air; an automobile 200 feet distant crushed like an egg shell under a 2-ton slab of concrete that had been hurled from the building. The explosion broke through a concrete floor slab 8 inches thick. Many of the children in rooms on the first floor were literally blown apart or mangled beyond recognition.

Tests have shown that an explosion may be experienced in a building without damaging it if there is about one square foot of window area or other wall openings, through which the explosion can relieve itself, for every 80 cubic feet in the building. To the extent that the vent area approaches this figure, the destructive force of an explosion tends to be reduced. The lack of vents in the concealed space below the first floor not only allowed the gas to accumulate to form a dangerous explosive mixture, but was responsible for the building being so completely blown to bits and for the resultant loss of life.

THE court of inquiry exonerated all school officials of personal blame. No one individual was held responsible. The disaster, however, may be traced to the lack of imagination on the part of local officials and citizens who could not visualize the danger or hazard.

The original design of the school's heating system called for a central steam heating plant. Such a system permits putting the heating boilers in a separate building or a cut off section, making the children safe from heating hazards. The first mistake was that

made when it was decided instead to install gas-steam radiators in the classrooms. Each of these was a self-contained heating unit and only required that gas be piped to an open flame burner. There were 72 such heaters throughout the building and they were apparently vented. As there were no flues in the walls the supposed vent simply entered a hole punched into the wall tile. Out of the stories about these vents probably came the early news reports that the walls had blown up because of gas accumulating in the hollow tiles. There appears to be no evidence to support the fact that there was any gas in the walls. The "dummy" vents show how little importance school officials, architects and heater salesmen attached to the children's safety.

The natural gas in question is substantially odorless. A simple safety measure is to give such gas a distinctive smell. This can be done at very small cost and had it been done in this case there might have been some warning of the impending explosion. Oil companies in California have made a practice of stenching their odorless gas, but this apparently has not been the rule in Texas and Oklahoma. Laws to compel stenching are before the Legislatures of both these states.

REPAIRS and additions to the gas piping under the first floor had been made by men who had worked around oil field equipment and knew enough to screw pipes and fittings together. They were in no sense experienced gas fitters and were hardly familiar, for example, with the N.F.P.A. Good Practice Requirements for the Installation, Maintenance and Use of City Gas, observance of which might have prevented the explosion. The workmen may have neglected to test the pipes for pressure leak before turning the gas in, failed to pull threaded joints up tight, omitted to apply lead or compound at the joint, or even cracked a pipe without knowing it. Any one of such small faults may have permitted the gas to accumulate and cause the explosion.

The gas which caused the explosion was not commercial "natural" gas, but the residue of a gasoline extraction plant. It was not sufficiently different from natural gas however so that there would have been any difference in result, had the gas featuring in the explosion been natural gas or manufactured illuminating gas. The school authorities were using an unauthorized supply of this gas but were not technically guilty of "stealing" it since the gas was waste gas and custom of the oil fields permitted its use. It was an inferior gas so far as quality was concerned and its volume and pressure varied considerably. This feature made the gas heating system just so much worse by reason of the frequent tinkering and adjusting of radiators and piping which it made necessary.

The investigation eliminated dynamite as a cause of the explosion, although dynamite was in use in the adjoining oil fields and 18 sticks stored in a basement room under the auditorium stage went through the explosion intact.

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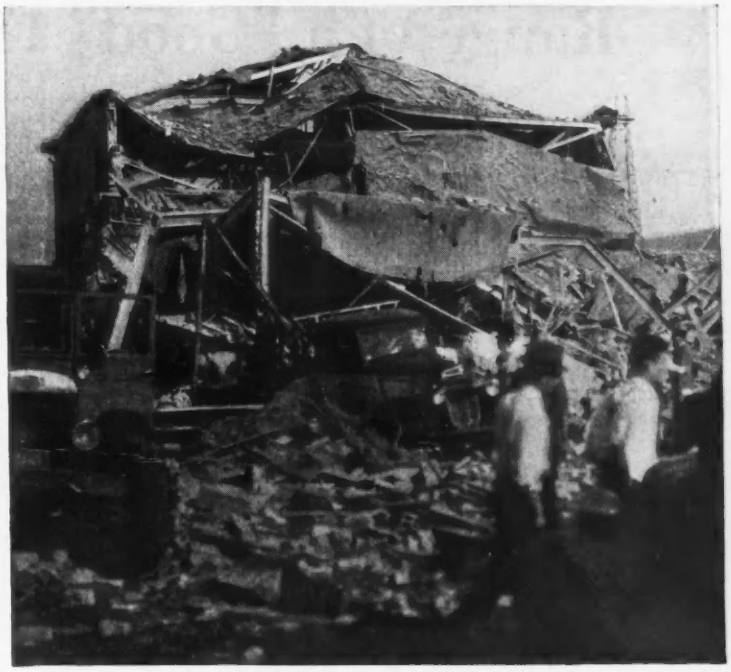

Wreckage of the auditorium stage shows the substantial character of the construction of the London, Texas, school building.

Discussion Subjects

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Q. What are the effective ranges of good fire streams from the various sizes of nozzles and pressures commonly used by fire departments?

A. With 50 pounds nozzle pressure a good fire stream will reach a distance of about 70 feet with the common nozzle sizes 1, 1⅛ and 1¼ inch. Wind conditions are likely to affect range more than other factors. See page 4 for a full discussion of effective ranges of fire streams.

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Q. What are the dangers of "water hammer" in a hose line and how can it be prevented?

A. "Water hammer" may burst hose lines. It can be prevented by opening and closing the shut-off nozzle slowly instead of instantly. The article on page 5 gives a more complete explanation.

Problem Questions
FOR MAY

Suggested for discussion at company and department meetings this month

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For how many years is it safe to leave tires on fire apparatus before replacing with new ones?

62

Do workmen's compensation laws apply to volunteer firemen?

Watch for the answers in the next issue of VOLUNTEER FIREMEN

Range of a "Good" Fire Stream

Seventy Feet Is Good Range, But Wind May Shorten It—Reach Can Be Bettered By Taking Smaller Nozzle and Stepping Up Pressure

GETTING hose streams which will put out the fire is an important part of a craftsmanlike job of fire fighting. It may therefore be worth trying to set up a mental picture of what constitutes a good fire stream and how to go about getting it.

The water comes out of the nozzle with good force and in a solid stream. At close range there is usually no question of its effectiveness. Farther away, the stream spreads and breaks up at its farthest reaches into small drops which are hardly more than a light rain. Such drops are not much use on a fire but there is some distance from the nozzle up to which the stream will do a good job on the fire and may be considered an effective stream. Where this point is is to a large extent a matter of judgment and a stream good enough for a small fire may not be good enough for another in which more material is burning.

One of the achievements which brought fame to the late John R. Freeman as a fire protection engineer was making the first complete set of tests ever made on hose streams and nozzles covering the entire range of those used in fire department work. He said that in judging hose streams, he classed as "good" those which:

1. Had not lost continuity by breaking into showers of spray.

2. Appeared to shoot nine-tenths of the whole volume of water inside a circle 15 inches in diameter and three-fourths of it inside a 10-inch circle, as nearly as could be judged by the eye.

Showing adverse effect of wind even on a high pressure hose stream.

3. Would probably be stiff enough to attain in fair condition the height or distance named, even though a fresh breeze were blowing.

4. With no wind would enter a room through a window opening and strike the ceiling with force enough to spatter well.

It is futile to try to set the range of a fire stream with too great accuracy or to try and remember too much details about what tests have shown. Freeman cautioned that his results might have an error of as great as 10 or 15 percent. Many tests made since show that the effect of wind tends to vary the effective range of a stream much more than differences in pressures and sizes of nozzles. Ten miles per hour is not a high wind by any means, but is enough to reduce the effective range of a stream by as much as 2/5 or 40 percent.

Taking out a line of hose, these principles can be tried out. Let us for sake of illustration, lay a 2½-inch line from a pumper and put on a 1⅛-inch nozzle, one of the commonest sizes used in fire operations. We start up the pump until there is about 20 pounds pressure at the nozzle. The nozzle is tilted up to get the maximum horizontal range. Applying Freeman's rules we can see that it is a good stream up to a point a little short of 40 feet from the nozzle (assuming there is not much wind).

Next, the pumper pressure is stepped up until the nozzle pressure is about 40 pounds. For this stream the range is about 60 feet. If the nozzle is tilted up until the stream is going nearly straight up, it will be observed that the vertical range is possibly a few feet better than the horizontal but not a difference of great importance.

When the pumper pressure is stepped up so that the nozzle pressure is about 50 pounds, we get a stream which is generally considered the most practical for general fire fighting work. Its range will be about 70 feet. If pressures are stepped up, the range can be increased further, but at the higher pressures the nozzle is harder to handle and the stream is therefore less practical for

Distance in Feet from the Nozzle at which Streams Will Do Effective Work with a Moderate Wind Blowing. With a Strong Wind the Reach is Greatly Reduced.

Pressure at Nozzle	SIZE OF NOZZLE									
	1-Inch		1⅛-Inch		1¼-Inch		1⅜-Inch		1½-Inch	
	Vertical Distance (Feet)	Horizontal Distance (Feet)	Vertical Distance (Feet)	Horizontal Distance (Feet)	Vertical Distance (Feet)	Horizontal Distance (Feet)	Vertical Distance (Feet)	Horizontal Distance (Feet)	Vertical Distance (Feet)	Horizontal Distance (Feet)
20	35	37	36	38	36	39	36	40	37	42
40	64	55	65	59	65	62	66	64	69	66
50	73	61	75	66	75	69	77	72	79	75
60	79	67	83	72	84	75	85	77	87	80
80	89	76	92	81	94	84	95	86	96	88

Nozzle pressures are as indicated by Pitot tube. The horizontal and vertical distances are based on experiments by John R. Freeman.

fire operations. As pressures are increased, there soon appears a point at which the pressure causes the stream to break up only a short distance from the nozzle and it ceases to be one which will do good work in extinguishing a fire. The pressure at which this break occurs depends on the smoothness of the nozzle.

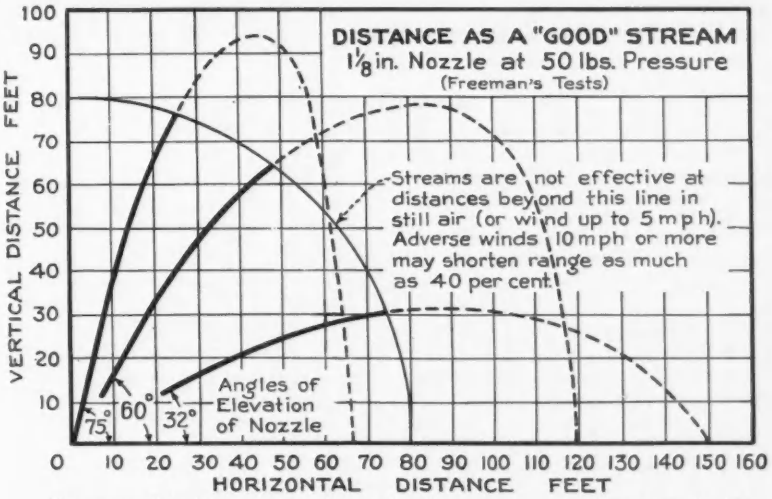
THE range of a fire stream can be somewhat increased by using larger nozzles, but the larger nozzle presupposes that the pumper and water supply can deliver greater quantities of water. As a practical matter, water is often limited. If a better stream is wanted, it is therefore necessary in most actual fire conditions to choose a nozzle one or two sizes *smaller*, and step up the pressure to get the additional range.

This can be seen by an example: a 1⅛-inch nozzle at 50 pounds pressure requires 265 gallons per minute. If a 1¼-inch nozzle is substituted a slight improvement in range could be obtained, two or three feet, but 326 gallons of water would be required at the same pressure. If, however, a 1-inch nozzle is substituted for the 1⅛-inch nozzle, the pressure could be stepped up to 80 pounds at the nozzle without using any more water than with the 1⅛-inch nozzle at 50 pounds. This would add about ten feet to the range of the stream.

Range can, of course, be improved by simply stepping up the pressure without changing nozzles, but higher pressures mean increased discharges and where the water supply is limited it is a better practical rule to shift to a smaller nozzle when greater effective range is desired.

The range of a hose stream is directly proportional to the pressure up to the point where the stream "breaks." A rule widely used in figuring range of streams is to take one foot of range to each pound of nozzle pressure. This gives ranges considerably below what a stream will do with good nozzles and favorable wind conditions, for the average pressures of around 50 pounds. Because the smoothness of the nozzles and the wind may have so much to do with performance, the use of this rule probably gives a roughly correct answer for many cases.

The best rule to remember about the effective range of a hose stream is that a 1⅛-inch nozzle at 50 pounds pressure gives a range of about 70 feet.


DISTANCE AS A "GOOD" STREAM
1⅛ in. Nozzle at 50 lbs. Pressure
(Freeman's Tests)
VERTICAL DISTANCE FEET
HORIZONTAL DISTANCE FEET
Streams are not effective at distances beyond this line in still air (or wind up to 5 m p h). Adverse winds 10 m p h or more may shorten range as much as 40 per cent!
Angles of Elevation of Nozzle
75°
60°
32°
100
90
80
70
60
50
40
30
20
10
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

Freeman plotted the center lines of the hose streams used in his tests. The range shown on the chart was that obtained with a smooth nozzle (not a fire department shut-off type), and with substantially no wind. The practical values for the range of streams given in the accompanying table were selected with due allowance for wind conditions of moderate intensity.

Smaller nozzles at the same pressure are only slightly less in effective range and larger nozzles only a little better. The range will be less if there is much wind. Add to this the practical rule of dropping to a smaller nozzle size and stepping up the pressure when greater range is required and you have a practical working knowledge that is entirely adequate for the vast majority of fire operations with ordinary hose lines.

The accompanying table gives the figures arrived at by Freeman for the range of hose streams for the pressures and nozzle sizes in commonest use. He said that very likely many persons would class a stream as a "good" one up to the point where he classes it as only fair, but he endeavored to allow a fair margin for the effect of wind. He expressed confidence that his classification as to the extreme point at which a stream may be called "good" is in general agreement with those terms as they would be used by experienced fire fighters. His judgment has been confirmed by the nearly 50 years which have elapsed since his researches.

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Water Hammer In Hose Lines

EVERYONE who has been in a fast moving automobile when the driver was suddenly forced to jam on the brakes is familiar with the power of momentum behind moving matter. The automobile may stop, but the occupants are apt to keep going right on through the windshield. The same momentum applies when water is rushing through a line of hose. The standard fire stream delivers a ton of water a minute. At 50 pounds nozzle pressure this ton of water is traveling at the rate of 85 feet per second or practically a mile a minute.

The man at the controls of a hose stream must therefore remember that the force of the stream is quite like an automobile speeding at sixty miles an hour. If the nozzle is slammed shut, the water tends to keep on traveling and builds up pressure in the hose. Hose is designed to withstand over 600 pounds pressure when it is new, but the pressures set up by the momentum of the water are frequently greater. The weakest part of the hose gives way.

The pressure is exerted backwards against the pump also which is enough to stall the pump in some cases. Pumpers are provided with automatic relief valves to take care of reasonable pressures built up while shutting down hose lines. However, such valves should not be expected to do the impossible any more than automobile brakes would be expected to stop in less than one second a 1 ton automobile going a mile a minute.

Shut down the pipe gradually. It is also important to open a nozzle gradually as the sudden surge of water is likely to throw nozzlemen off balance.

Household Refrigerators

Fire Departments Are Answering Occasional Alarms Due to Electric Motors or the Refrigerants Which Are Often Flammable or Poisonous

THERE are some 9,000,000 automatic household refrigerators in use in the United States and Canada. New ones are going into homes at the rate of about 2,000,000 a year. The N.F.P.A. recently investigated the fire record of these units and found it to be exceptionally good considering the number in use. Nevertheless fires have taken place and other occurrences such as leakage of refrigerants have resulted in driving people from buildings or causing injuries. These considerations make adequate safeguards a matter of first importance.

There is some variation in the operating mechanisms of the various household refrigerators and the hazard of the gas or liquid refrigerant used. The best general advice that can be given to those who may ask about the fire and life hazards is that they insist that the refrigerator be of a make listed by Underwriters' Laboratories, Inc. Most of the household refrigeration units sold are so listed which assures that the necessary safeguarding features are incorporated into the machine. For example, a number of refrigerators have blown up apparently because the various parts of the refrigerator were not structurally strong enough to resist the pressures developed.

In a New Orleans dwelling a householder saw flames coming from the top of her refrigerator. As she went to turn off the switch, an explosion occurred which blew off the metal refrigerator top. The top tore a hole in the side of the house, glanced through a window, hit a fence, and bounced back through the window into the room. Firemen experienced difficulty in getting into the house due to escaping sulphur dioxide. The cause of this explosion is not definitely known. It is thought that perhaps the bearing grease was vaporized due to overheating of the motor and reached explosive concentration in the sealed chamber. It is also possible that the compression chamber burst.

Household refrigerators can be classed in two general groups—the compression type and the absorption type. The compression type is by far the most common. In these refrigerators the extraction of heat from the air in the box is accomplished by allowing a liquid of low boiling point to evaporate and then expand in the cooling unit located in the ice compartment of the box. The gas resulting from the evaporation is carried by tubing to an electrically driven compressor or pump. The compressor condenses the gas to its liquid state at the temperature of the condenser coils. The liquid is returned to the container in the ice compartment to re-evaporate and the cycle is repeated.

It is estimated that not more than 5 per cent of all automatic household refrigerators are of the heat absorption type. In these machines refrigeration also depends upon the evaporation of a liquid refrigerant. The evaporation is caused by reducing the pressure above the liquid. This is done by absorbing the vapor or gas given off. The gas is then driven from the absorbing medium by heat and passed through a condenser which reduces it into the liquid state. It is then re-evaporated in the cooling unit and the cycle is repeated. The heat necessary for the process is supplied by a gas or kerosene flame or in a limited number of cases by an electric heater.

This type is commonly found in rural districts where electric service is not available.

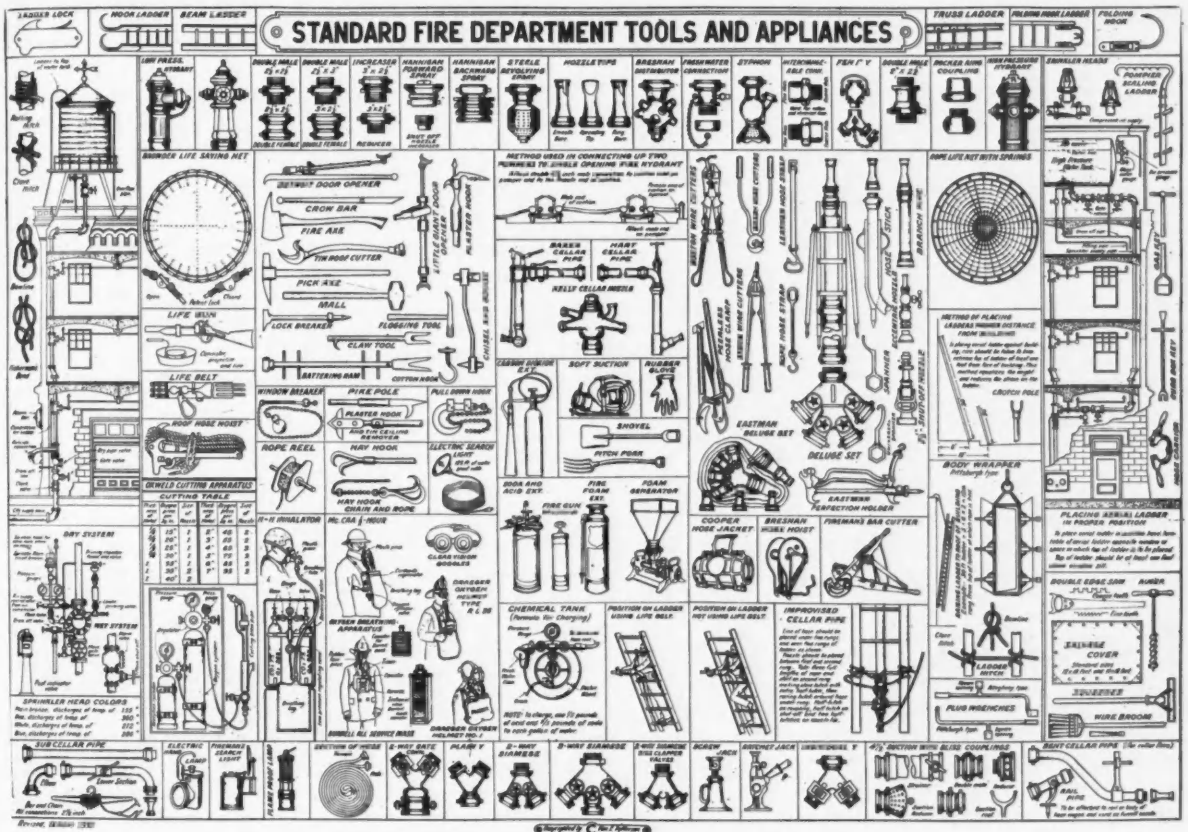
THE first hazards of the compression type of refrigerator are the fire and accident hazards due to the presence of electricity. When mechanical refrigerators were first being widely distributed the hazard of the motor was considered negligible. It is usually a motor of fractional horse power taking a very small current. However, experience has shown that such mechanical equipment is a hazard in the hands of the average householder or shop keeper. Any motor may overheat and become a fire hazard when overloaded or short-circuited while not supplied with adequate fuse protection. Fire departments are making occasional runs to fires in refrigerator motors. The New York City Fire Department made 36 runs in the first three months of this year. These were not trivial fires by any means as 8 of the 36 reported in New York City had extended from the motor to walls, partitions or other nearby woodwork. It is probable that many of these fires were not in motors protected according to the National Electrical Code rule which requires running protection of not over 140 per cent of the rated current of the motor on all automatically started motors from ⅛ to 1 horse power. The most modern form of protection is a thermal cut-off built into a refrigerator forming an integral part of the motor.

To protect against the electrical hazards, the motor, wiring, and control switch must be examined and tested. The motor must withstand insulation and heating tests; the wiring must be of adequate size and properly insulated and protected; and the control switch must withstand a repeated operation test, be constructed of suitable material, and its parts must be properly spaced and insulated.

The second and more serious hazard of refrigeration machines is that due to the gas used as a refrigerant. The most frequently used refrigerant is sulphur dioxide (SO_2) gas. Sulphur dioxide is not flammable. It is, however, an indirect fire hazard in that its liberation retards fire fighting operations. A fire in the basement of a Bakersfield, Calif. candy store involved the refrigerator and liberated large amounts of sulphur dioxide. Twenty-six firemen and four policemen were overcome by the gas during the course of the fire. There are a dozen or more similar cases on record.

OTHER common refrigerants that that have figured in accidents are methyl chloride, ethyl chloride and iso-butane.

Methyl chloride (CH_3Cl) is both flammable and explosive (but only moderately so) when mixed with air in suitable proportions. In contact with flame or hot surfaces, it produces toxic and irritating fumes. Of itself, however, it is somewhat toxic though having a mild and rather pleasant odor. In 1929 the use of methyl chloride in refrigerators in Chicago was greatly restricted by ordinance as a result of several cases where the escaping gas caused fatal poisoning. The hazards of



The above chart showing various fire department tools and appliances is used by the courtesy of William E. Patterson of the Pittsburgh, Pennsylvania, Fire Department. Blueprints of this chart, size 27 by 40 inches, are available to any fire department for $2.00 each by writing to Mr. Patterson at 204 City-County Building, Pittsburgh, Pa. Such charts are often used at firemen's training schools and for posting in fire stations.

ethyl chloride (CH_2Cl) are similar to those of methyl chloride.

Iso-butane ($(CH_3)_2CH$) is a flammable and explosive gas comparable with gasoline vapor. Ammonia (NH_3), while a good refrigerant, has been little used in small unit refrigerator systems. Ammonia is often a hindrance to firemen. In a typical fire in a restaurant kitchen an ammonia refrigerator pipe melted and before the fire could be extinguished gas masks had to be put on and the pipe repaired.

The fluoro compound refrigerants that have been developed in recent years such as dichlorodifluoromethane (CCl_2F_2) have not resulted in any accidents reported to the N.F.P.A. Department of Fire Record. They are in general non-flammable. When in contact with flame or hot surfaces, they may produce toxic fumes but the odor gives warning of their presence before a dangerous concentration is reached.

NEW CATALOGUES

This department is for the convenience of readers who wish to be advised of new products or services in the fire field. When writing for catalogues please mention VOLUNTEER FIREMEN.

Buffalo Fire Appliance Corporation, 44 Central Ave., Buffalo, N. Y. "Buffalo Fire Apparatus", 20 pages. Descriptive material on apparatus, ladders, bells, sirens, searchlights, and extinguishers.

California Fire Extinguisher Company, 69 Main Street, San Francisco, Calif. Two leaflets describing various types of portable "Pacific" pumpers and forestry hose.

C-O-Two Fire Equipment Company, 560 Belmont Avenue, Newark, New Jersey. Folder C-12 illustrating hand and wheeled types of carbon dioxide fire extinguishers.

W. S. Darley and Company, 2810 Washington Blvd., Chicago, Ill. Literature illustrating and describing a complete line of fire apparatus and pumps.

Federal Electric Company, 8717 South State St., Chicago, Ill. Bulletins Nos. 55 and 56. Complete details of Federal sirens.

Gamewell Company, Newton Upper Falls, Mass. "Vitaguard", a manual, 40 pages. A complete description of the Vitaguard fire alarm system for volunteer fire departments and industrial plants.

Koehler Manufacturing Company, Marlboro, Mass. "Wheat Electric Cap Lamps", 10-page catalogue. Description of safety miners' cap lamps, charging equipment and accessories.

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa. Bulletin EE-1, 4 pages. Information on M.S.A. ammonia masks.

D. B. Smith and Company, Smith Building, Utica, New York. "Indian Fire Pump", Catalogue, 8 pages. Showing full line of Indian fire pumps, supply tank, carrying rack, repair parts, and pump tank extinguisher.

Tests of Bulb Fire Extinguishers

Underwriters' Laboratories Says Carbon Tetrachloride Bulbs Automatically Dumping Contents on Floors May Not Be Relied on to Extinguish Fires

WHATEVER extinguishing effect 1- or 2-pint bulbs of carbon tetrachloride dumping contents on floors may have on certain fires in small rooms is greatly assisted by the smothering action of the products of combustion according to a report just issued by Underwriters' Laboratories, Inc., of Chicago. The report is published in full in the N.F.P.A. Quarterly, April 1937, and available in separate pamphlet form on request to the N. F. P. A. or to Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill.

The fire tests were made with these devices in small rooms or compartments. Of 105 tests, 14 were made *without extinguishers in the rooms* to compare results with the other tests made with extinguishers present. A summary of the results is given in the following tables:

TABLE 1
Summary of Fire Tests in Small Rooms with Automatic Glass Bulb-Type Carbon Tetrachloride Fire Extinguishers

Type of Fire	Number of Tests	Test Results	
		Fire Extinguished	Not Extinguished
Class A. **Fires with Woodwool**	15	1	14
Class B. **Fires with Cotton Waste**	18	4	14
Class B. **Fires with Gasoline**	58	16	42
	91	21	70

TABLE 2
Summary of Fire Tests in Small Rooms without Extinguishers

Type of Fire	Number of Tests	Test Results	
		Fire Extinguished	Not Extinguished
Class A. **Fires with Woodwool**	2	0	2
Class B. **Fires with Cotton Waste**	4	2	2
Class B. **Fires with Gasoline**	8	8	0
	14	10	4

During several years past many observations have been made by Underwriters' Laboratories, Inc., of the performance, in fire tests, of automatically operated bulb-type carbon tetrachloride fire extinguishers. The devices used in these tests were made in different forms but all employed carbon tetrachloride as the extinguishing medium.

The two sketches of the accompanying diagram illustrate in a general way the two styles of devices tested. One style is designed for ceiling mounting; the other to be mounted on a wall. While no test sample was exactly like either of the sketches, none of them differed in principle and application.

Space limitations prevent listing here 23 representative fire tests with three classes of test fires described in the report. The three classes of fire are characterized by the kind of fuel employed as follows:

1. Woodwool excelsior (a Class A fire).
2. Gasoline-saturated cotton waste (a Class B fire).
3. Open containers of gasoline (also a Class B fire).

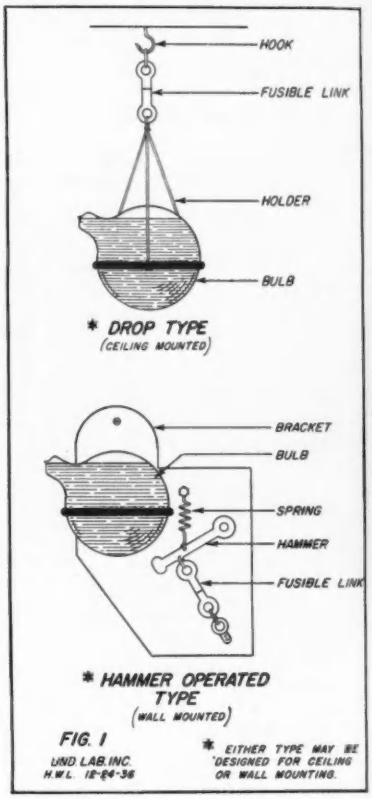
These types of fires are regularly employed in the classification of various hand fire extinguishers.

In addition, tests were described recording performances observed under duplicate test conditions except that no extinguishers were used.

The tests were made in rooms of 1,000, 600, or 400-cubic feet capacity. These rooms were especially built of sheet metal. The 1,000-cubic foot room was 10 by 10 by 10 feet; the smaller rooms had 9-foot ceilings. The floors were of sheet steel with sand poured over possible cracks. When completed, the structures were so tight that definite pressure was built up within them following ignition of the burning material.

Most of the test fires were located on the floor in the center of the room. Ignition was by means of a match thrown from the door of the room which was closed immediately. In most tests the door and the windows were also tightly closed during each test.

Study of the tests with woodwool (a Class A fire) showed no practical extinguishing effect under favorable circumstances of placement and lack of ventilation.



The results of the tests conducted with gasoline-saturated cotton waste (a Class B fire) failed to be convincing as to any extinguishing capacity of the device. Study of certain tests indicated that whatever extinguishing effect is afforded by the devices is greatly assisted by the smothering action of the products of combustion.

The tests with fires in open containers of gasoline (also a Class B fire) further demonstrated the influence of the products of combustion. Certain tests (including some of those conducted without extinguishers) showed that the operation of one or two devices in a small room has only moderate assisting effect.

Other tests demonstrated that with reasonable ventilation the rooms are not protected by automatic equipment of this type.

HAVE YOU A

Fire Trap

IN YOUR TOWN?

EVERY community has its "fire traps". . . buildings which because of construction, location, occupancy, or other factors, would mean a hopeless battle if they ever "got going." When fire starts in such a place, your only chance is to catch it in its infancy. But . . . can you be sure that the blaze will be discovered and reported in time?

The answer is YES—if the premises are protected by the Aero Automatic Fire Alarm, which automatically detects fire when it starts, and automatically transmits the alarm direct to the fire department. So if you have any of these fire traps in your town . . . let us know, and we shall be glad to cooperate with you in consulting the owners about Aero protection.

Aero is a pneumatic "rate-of-rise" system, assuring the fastest possible detection of fire. It is easy to install, inconspicuous in appearance, adaptable to any size or type of building. No capital outlay is required for installation.

Aero's efficiency is proved by its performance record in protecting all types of properties throughout the country. The Aero system is installed only by A.D.T., a nation-wide organization specializing in fire and burglary protection services. Write for complete information.

AERO AUTOMATIC FIRE ALARM

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

155 Sixth Avenue New York, N.Y.

A NATION-WIDE PROTECTION SERVICE AGAINST FIRE, BURGLARY AND HOLDUP

A·D·T

1 GALLON—DUPLEX PUMP
"CAPTAIN"-FYR-FYTER
AN IDEAL EXTINGUISHER FOR VOLUNTEER FIRE DEPARTMENTS

Here is the equivalent of four 1-quart extinguishers built into one thus making this large quantity of vaporizing liquid available without running for another extinguisher when more than the average size blaze is encountered. This is but one of the complete line of Fyr-Fyter Extinguishers each of which have exclusive merits which stamp them as superior.

DEALERS WANTED

If you are interested in adding to your income by spare time work or in building a permanent business for yourself without investment in stock, fixtures, etc., write for our new Dealer's Plan to

FYR-FYTER COMPANY
Dept. 20-17 DAYTON, OHIO

Membership Plan

VOLUNTEER FIREMEN'S SECTION
NATIONAL FIRE PROTECTION ASSOCIATION

WHERE twenty or more firemen in a volunteer company or department affiliate with the Volunteer Firemen's Section the cost is 50 cents a year *per man*. Each fireman will receive one copy of VOLUNTEER FIREMEN, the monthly journal of the Volunteer Firemen's Section, mailed regularly to his home address. The company or department automatically becomes a member of the National Fire Protection Association and is entitled to full privileges of membership. All the literature regularly issued to N.F.P.A. members is mailed to headquarters of the company or department.

Membership may be applied for by one member of the company or department collecting 50 cents for each of the 20 or more members and making a single remittance for the group, or the company or department may take a membership for its men and make a single remittance from the company or department treasury.

Because of the large amount of material mailed to members, not less than $10.00 can be accepted from any company or department for membership dues.

Volunteer Firemen

Professional Journal of the Volunteer Firemen's Section of the National Fire Protection Association

Published by the National Fire Protection Association, a voluntary non-profit organization, 60 Batterymarch Street, Boston, Massachusetts, U.S.A. Franklin H. Wentworth, Managing Director. Percy Bugbee, Assistant Managing Director. Horatio Bond, Managing Editor.

Volume 4 **May, 1937** Number 5

Pennypinching *vs* Safety One lesson which can be drawn from the shocking disaster which claimed the lives of 294 persons, mostly children, in the London, Texas, school explosion, is that pennypinching does not pay when safety is a consideration. No legal responsibility has been established against any person or corporation but it looks as though some persons and corporations should have to accept the moral responsibility by reason of certain of their acts and omissions which led to the tragedy.

The oil industry of Texas has saved a few pennies by not giving a warning odor to natural gas in lines which people are allowed to use.

The school officials of the "wealthiest rural school district in the world" were saving a nickel here and there when they decided against a central heating plant which would have been safe. The installation of dummy vents on classroom heaters, while in no way contributing directly to this explosion, makes it difficult for school officials, architects and the concerns which sold and installed the heaters to deny that they were thinking in terms of what they could save and were not interested enough in safety to inform themselves of the hazard.

598 New Members and 1019 Renewals During the past month 598 men from the 28 fire departments listed below enrolled in the Volunteer Firemen's Section for the first time. In addition to this, 1019 men from 41 companies and departments renewed their memberships. The total membership of the section is now 11,621.

Williams Volunteer Fire Department, Williams, Arizona.
DeQueen Fire Department, DeQueen, Arkansas.
Davis Fire Department, Davis, California.
Liberty Fire Company No. 1, Peru, Illinois.
Lowell Fire Department, Lowell, Indiana.
Anita Volunteer Fire Department, Anita, Iowa.
Charles City Volunteer Fire Department, Charles City, Iowa.
Decorah Volunteer Fire Department, Decorah, Iowa.
Van Buren Fire Department, Van Buren, Maine.
Canton Fire Department, Canton, Massachusetts.
Hyannis Fire District, Hyannis, Massachusetts.
Hastings Fire Department, Hastings, Nebraska.
North Platte Fire Department, North Platte, Nebraska.
Ogallala Volunteer Fire Department, Ogallala, Nebraska.
Glenwood Hook and Ladder, Engine and Hose Company, Inc., Glenwood Landing, New York.
Holbrook Fire Department, Holbrook, New York.
Board of Fire Control of Malverne, Malverne, New York.
The Columbia Mills Fire Department, Minetto, New York.
Atlantic Hook and Ladder Company No. 1, Port Washington, New York.
West Albany Volunteer Fire Company, Inc., No. 1, West Albany, New York.
Pinehurst Fire Department, Pinehurst, North Carolina.
Lachute Fire Department, Lachute, Quebec.
Corsica Volunteer Fire Department, Corsica, South Dakota.
Miller Fire Department, Miller, South Dakota.
Kingsport Fire Department, Kingsport, Tennessee.
St. George Volunteer Fire Department, St. George, Utah.
Front Royal Relief Fire Department, Front Royal, Virginia.
Poulsbo Volunteer Fire Department, Poulsbo, Washington.

WASHINGTON, D.C.

ADDS ADDITIONAL PIRSCH APPARATUS

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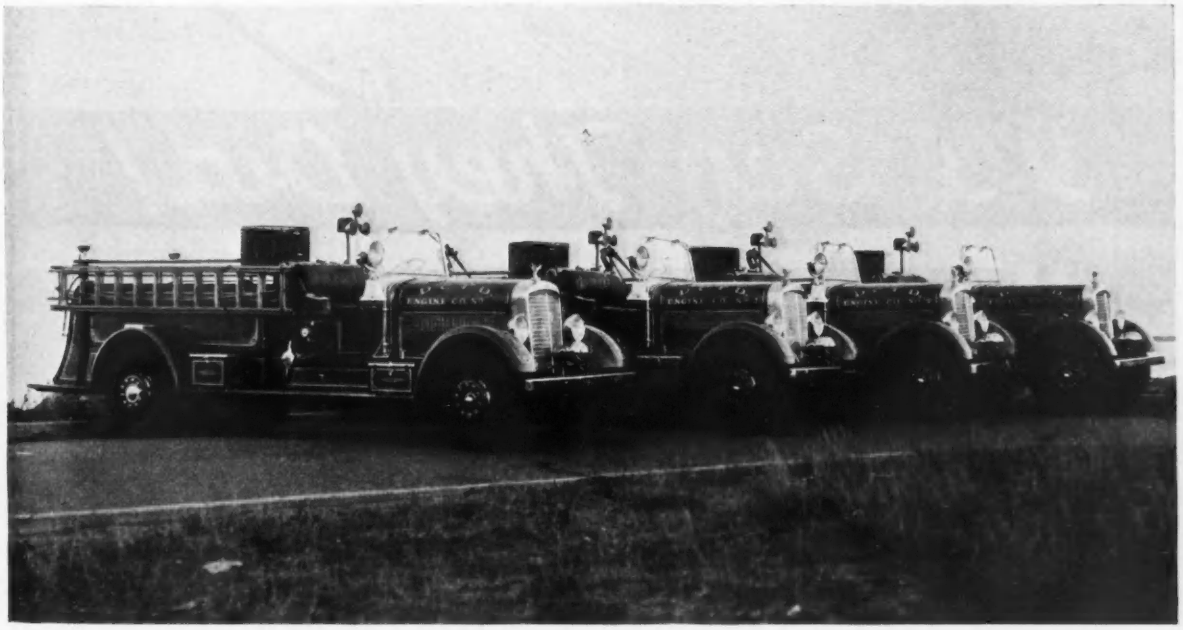
Showing Four New Pirsch 750-Gallon Series-Parallel Pumping Engines for District of Columbia



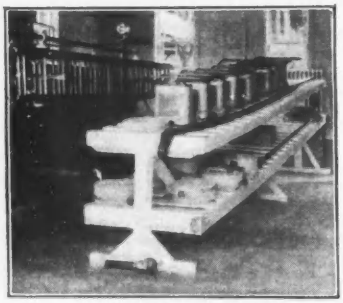
In 1932 the District of Columbia purchased four pieces of Pirsch apparatus—(two pumpers and two Hydro-Mechanical Aerial Ladder Trucks) and in 1936 purchased four additional pumpers making a total of eight Pirsch Fire Engines now in service in the Fire Department of the Nation's Capitol.

FOR ORIGINALITY IN DESIGN—PROPER CONSTRUCTION—SMOOTH, EFFICIENT PERFORMANCE, BUY PIRSCH

PETER PIRSCH & SONS CO., Kenosha, Wisconsin

I'll Say They Did!

Curved tanks fit back snugly. Weight distributed high on shoulders prevents fatigue. Ventilation feature prevents dampness touching carrier's back.



Ten Indians in Rack at Long Lake, N. Y. Fire House

NO hose to lay. Two or three men with INDIANS go to work and it's all over in a jiffy. Five-gallon tanks can be kept filled constantly. Just as valuable for roof, chimney, partition, inside spot fires as for grass and brush fires. No wonder more and more departments are increasing their supply of INDIANS. These portable fire pumps have proved their efficiency many times over.

Uses clear water, no chemicals. Heavy galvanized 5-gallon, curved tank straps on back; large brass filler opening; adjustable carrying straps; strong hose; solid brass pump throws 50-foot fire stream with ease. Always works. Thousands in use. Highly recommended by forestry officials and fire departments.

Send for Illustrated Catalog and Copies of Testimonials

The One Man Fire Department

MADE BY D. B. SMITH & CO., UTICA, N. Y.

Pacific Coast Agents:

HERCULES EQUIPMENT & RUBBER CO.
550 Third St., San Francisco, Calif.

WESTERN LOGGERS' MACHINERY CO.
302 SW. 4th St., Portland, Oregon.

PACIFIC MARINE SUPPLY CO.
1217 Western Ave., Seattle, Wash.

VITAGUARD

Fire Alarm System for Volunteer Fire Departments

STREET FIRE ALARM BOXES PROPERLY DISTRIBUTED WITH REFERENCE TO FIRE HAZARDS PROVIDE THE MOST RELIABLE AND ACCESSIBLE MEANS OF TRANSMITTING ALARMS TO THE FIRE DEPARTMENT.

Fire Station Operating and Control Unit

Includes recording register, code signal transmitter, battery and charging equipment, testing and protection devices.

VITAGUARD
Street Signal Station

Provides protection against loss of alarms under disordered circuit conditions.

THE Vitaguard System may be extended to the protection of special fire hazards such as Institutions, Schools, Hospitals, Court Houses, Factories, and Mercantile Establishments within which automatic fire detecting features constantly guard the property.

Public Alarm Equipment automatically controlled by the fire alarm system directs the firemen to the location of fire.

Prompt Alarms Reduce The Fire Loss.

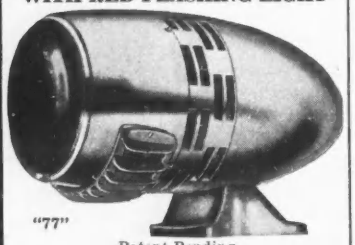
Plans and estimates furnished without cost or obligation.

Write for 40-page descriptive catalogue

THE GAMEWELL COMPANY

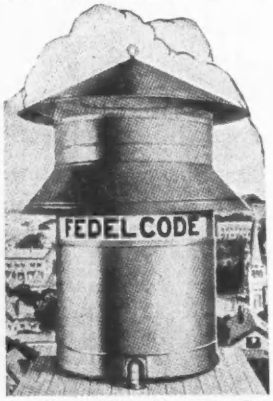
NEWTON UPPER FALLS, MASSACHUSETTS

Specify
FEDERAL "77"
DOUBLETONE,
LONG ROLL SIREN
WITH RED FLASHING LIGHT



"77"
Patent Pending

Here is a siren with two distinct tones—a high, piercing tone to penetrate closed cars with a shriek for instant action—and a low, carrying tone that clears traffic for blocks ahead. To add to the carrying power, the frequencies of the two tones cross at regular intervals to produce an extra weighted beat that rolls ahead like the third wave at the seashore. You get two tones and triple power! And combined with this are the features of our famous C-5 Coaster Siren—the brilliant red or green flashing light beam, enabling traffic to both SEE and HEAR your warning—long roll of more than TWO MINUTES after current is shut off—grease sealed ball bearing motor — all-chrome finish. Write for New Bulletin No. 56 for complete details.



Federal Vertical Siren Mounted on Tower.
Approved by the National Board of Fire Underwriters.

Federal VERTICAL Sirens are most practical because

(1) They distribute sound in a wide range in all directions.
(2) Rugged in construction to withstand all kinds of abuse.
(3) Entirely weatherproof housing finished in Red Duco withstands sleet, rain, hail and dust storms.
(4) They are equipped with special high speed, ball bearing Federal Siren motors.

Write for Bulletin No. 55 for complete details.

FEDERAL ELECTRIC CO.
8717 So. State St. Chicago, Ill.

Can You Use Ten Dollars?

If You Can, Submit Your Story in Pyrene Letter Contest — Cash Prizes This Month

CHIEF Alfred E. Schumki of Charleston, Arkansas, who won honorable mention this month added this note to his letter: "I have been reading your contest letters for some time and get very much out of them—lessons and action, which any true fireman likes." Many comments such as this one indicate the popularity of the contest.

Write down in your own words some experience you or others have had with putting out fires with fire extinguishers. Then submit it next month in this contest sponsored cooperatively by the Pyrene Manufacturing Company of Newark, N. J., and VOLUNTEER FIREMEN. Be sure to give the size of extinguisher used. Your letter may win.

FIRST PRIZE — $10.00

H. E. CODDING, *Chief*,
Fire Department, Woodstock, Vermont.

Pleases the Town Taxpayers

"Answering an alarm one morning last summer we found the village tar wagon all afire. There were about four barrels of road tar on the inside and six barrels on the outside—the whole thing a mass of flames. Black smoke was shooting 75 feet into the air, and six coal pockets were less than 20 feet away.

"The crowd that gathered laughed when we grabbed two 2½-gallon extinguishers (one a foam type and the other a soda-acid) and started to close in on the job. I sent my driver to a near-by garage for two more foam extinguishers. The results—a bad fire stopped on the spot with two men and four extinguishers, with the town taxpayers pleased."

SECOND PRIZE — $3.00

A. MOWAT, *Chief*,
Fire Department, Brandon, Manitoba.

8000-Gallon Gasoline Tank Fire

"Perhaps the most remarkable experience in my 26 years of fire fighting happened when an 8000-gallon tank of gasoline caught fire. We couldn't get near the tank with our apparatus so I ran to it with a 1-quart carbon tetrachloride extinguisher. The fire was burning fiercely around the top of the tank, the cap having been displaced somehow.

"Alongside the tank stood a carload of sand which was used generously, but with no effect. I climbed the tank, got as close as the heat would allow, pumped the carbon tetrachloride into the base of the fire, and in less than a minute the fire was out."

THIRD PRIZE — $2.00

W. A. MEYER,
Fire Department, Clinton, Iowa.

Fire in Airplane 1000 Feet Up

"While attending an aeronautics school in Oklahoma my instructor and I had a terrifying experience. We were practicing landings and I had just closed the throttle at 1000 feet when the motor backfired and ignited the oil-soaked belly of our ship. Our altitude was not enough to use parachutes.

"My instructor jerked loose a 1-quart carbon tetrachloride extinguisher and managed to fight the fire enough to enable me to make a rather rough landing in the next field.

HONORABLE MENTION

FRANK O'RIELLY, *Chief*,
Volunteer Fire Dept., Fort Pierre, S. D.

FRANK H. PILLSBURY, JR.,
Fire Dept., Mountain Lakes, N. J.

ALFRED E. SCHUMKI, *Chief*,
Volunteer Fire Dept., Charleston, Ark.

CONTEST RULES

1. Contestants in the Pyrene Prize Letter Contest must be members of their local fire department.
2. Letters are to describe actual experiences where any approved fire extinguisher of any make has saved lives or property.
3. Trade names may be used but will be deleted in publication. Publishers reserve the right to edit winning letters to permit publication.
4. Each contestant automatically vouches for the truth of the facts presented from his own or others' experience.
5. Only one letter may be submitted each month.
6. Letters must be legibly written in ink or typewritten on white paper, one side only. Preference will be given to letters not over 250 words in length.
7. Letters received after the 8th of the month will be judged in following month's competition.
8. Monthly prizes in cash will be: 1st, $10.00; 2nd, $3.00; and 3rd, $2.00.
9. Address contest letters to Pyrene Prize Letter Contest, National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

CHAMPION Fire Apparatus $1183 To $1569

Not Including Chassis

Complete Basic Equipment Except Hose, Ladders and Accessories

Engineered and built on any commercial truck chassis you select — Ford, Chevrolet, Dodge, International, Studebaker, Diamond T, GMC, Reo, Federal—Built to your specifications for city, town, village, community, rural or forestry service. Meets all Underwriter Tests in the U. S. and Canada. Accepted by insurance bureaus in all states the same as more expensive apparatus. All Bureaus recognize Champion Fire Apparatus for maximum insurance rate reductions.

Weighs Only 650 lbs.

$565 to $645

Price includes two 2½" Discharge Valves, 4 Caps and Chains, 4 Gauges, 2 Booster Valves—all chrome plated. Auxiliary Motor Cooling, Automatic Primer, Clutch Hand Lever, Chrome Nickel Stainless Steel Drive Shaft, Drain cock, brackets for mounting on any chassis. Easy blue prints and instructions—everything for complete installation.

Champion M500 Geared Drive Centrifugal Fire Pump

Underwriters Approved for installation to Ford, Chevrolet, Dodge, Reo, GMC, International, Diamond T, Studebaker, Federal.

Automatically Primed. Built-in cooling for motor and gear box.

Because of built-in efficiency higher than has ever before been achieved in fire pump construction, the M500 requires ONLY 2 gears to deliver the rigid Underwriter tests. Powered by any truck motor, the M500 Champion far surpasses Underwriter rating of 500 GPM; actually delivers 650 GPM at suction and 800 GPM from fair hydrants.

Motor operates at speeds 2½ times slower than pump.

Gears running in oil. Gear box has built-in water jacket as extra cooling feature (gears sealed from water).

Unconditionally guaranteed for 10 years. If, at any time, your Champion Fire Pump fails to give the service you expect, we will replace it with a new pump.

Easily mounted on any chassis under seat or under cab as shown above—allows more space for longer hose body.

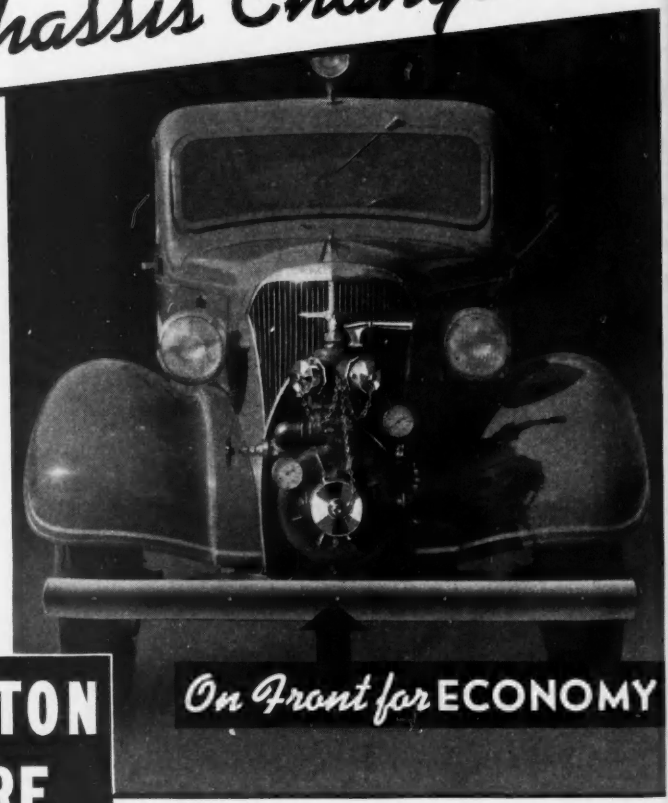
We'll gladly ship on 30 days' free trial. ☞ You be the judge if there is any better fire pump AT ANY PRICE. ☜ If there is, return ours and we will pay the freight both ways.

Remember, too, that in addition to freight charges we will also reimburse you to the extent of labor charges involved in making the installation and removing the pump should you, for any reason, decide against the purchase.

Write for Advertising Literature illustrating and describing the complete line of Champion Fire Apparatus and Fire Pumps, Direct Drive and Gear Drive, Midship and Front Mounted.

W. S. DARLEY & CO.
2810 Washington Blvd. Chicago, U.S.A.

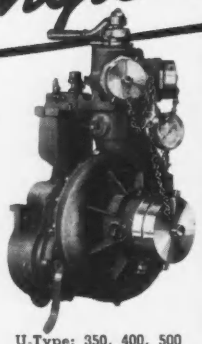
COMPLETELY INSTALLED *Without A Single Chassis Change!*



On Front for ECONOMY

GEAR DRIVE

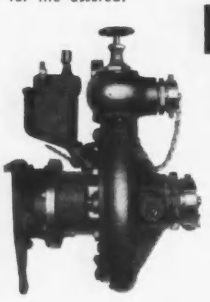
NOTHING FINER—Every U-Type Barton Pump is regularly equipped with built-in Gear Drive—truck motor operates at approximately ONE-HALF pump speed. With pump wide open and discharging at 250 lbs. pressure, motor loafs along—NO RACING—NO STRAIN! Long motor life assured.



U-Type: 350, 400, 500 and 600-gallon sizes.

DIRECT DRIVE

LOW PRICE—F-Type Pumps are also 250 lb. high-pressure units, having every U-Type feature except Gear Drive. They are Direct Drive pumps, operating at direct motor speeds, making for extremely low cost. We also build smaller Barton booster fire pumps at still lower prices.



F-Type: 400, 500 and 600-gallon sizes.

BARTON FIRE PUMPS

Ten years have passed since the first Barton Fire Pumps went into service, and these first pumps are still making good—for we maintain the highest standards of workmanship and use the finest materials money can buy.

"How is it then that a Barton Pump saves so much in first cost?"—a fair question, frequently asked. The answer is found in our unique design and in our method of mounting. For any capacity rating, a Barton Centrifugal Fire Pump is smaller, more compact and weighs less than older types. You buy no excess weight — no expensive gadgets. Lower cost, naturally!

But that's only half the economy story! Because of Front-Mounting (see above), a special expensive truck is not required. Any size Barton Pump can be used on a standard truck—completely installed and ready for service without a single chassis change, costing only a few dollars for mechanic's labor.

UNDERWRITERS' TESTED

Barton Fire Pumps meet and exceed Underwriters' requirements. They will handle clean or DIRTY water. They are Automatically Primed. And there's a size for every need and pocketbook. Write for full details today!

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN . . . PUMPS AND PUMPS ONLY SINCE 1873

PRINTED IN U. S. A.

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